

## BEES FROM NORTHERN CALIFORNIA

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That part of California which lies north of San Francisco and west of the Sacramento Valley is a region of extraordinary interest for the biologist, containing a fauna and flora which is in many ways unique and suggestive of vast antiquity. In particular, it is the home of the redwood, which formerly was widespread over the Northern Hemisphere, but now makes its last stand in California. My wife and I visited this region April, 1935, in company with Mr. Edward P. Van Duzee, to whom we are more indebted than we can well express. We obtained a rather large collection of bees, many of them new to science. The flowers visited were noted in most cases, and for the identification of the plants, we are indebted to Miss Alice Eastwood.

The present paper represents a first contribution to the knowledge of the bee fauna of this region. The bees of Oregon and Washington on the one hand, and of California south of San Francisco Bay on the other, have been rather extensively though still very incompletely investigated. Those of the coast region of northern California have been neglected, except for a certain number of records scattered through the literature, perhaps fairly numerous should they be assembled. In the present contribution some records are given of specimens collected years ago, now in the collection of the California Academy. All the holotypes of the species now described will be placed in the Academy. It is hoped that in course of time this bee fauna will become sufficiently well known to justify a summary and critical discussion. Indeed, the whole biota of the redwood country and adjacent regions should be dealt with in a similar manner, and should eventually form the subject of an extremely interesting book.

Many of the bees not listed here have been studied by Mr. Chas. Michener, who will report upon them.

## MEGACHILIDÆ

*Raphidostoma* Cockerell, gen. nov. (Osmiinæ)

Small bees somewhat related to *Chelostoma* Latr., but easily distinguished by the characters of the labial palpi, the antennæ, and the abdomen.

Male. Maxillary palpi three-jointed, the basal joint small and short; labial palpi very long, the first two joints very broad, with a minutely reticulate surface, the second joint about twice as long as the first; two slender apical joints, the last a little longer than the penultimate, both directed sideways from the end of the second joint. (In *Chelostoma florisomne* L., there seems to be only one small apical joint, but there are really two, only the penultimate one is in a line with the second joint); tongue long and slender, a little exceeding the labial palpi; mandibles bidentate; malar space linear; clypeus simple, covered with a dense beard; antennæ very long and slender, the flagellum quite simple; mesothorax and scutellum finely and closely punctured; area of metathorax short; stigma of moderate size (about as in *Chelostoma minutum* Crawford); basal nervure meeting nervulus; second cubital cell not very long (very long in *C. florisomne*), receiving the first recurrent nervure at a distance from base about equal to half intercubitus, and the second nearer apex; marginal cell long, obtuse at end; legs slender, simple; claws cleft, pulvilli distinct; abdomen strongly convex, oval, first tergite broadly cup-shaped, with a short petiole, the basal portion bounded by a slender rim; apical tergites turned downward, the apex broadly rounded and simple; venter flattened, without any tooth or process, but with much white hair. Type *R. ceanothi* sp. n.

#### *Raphidostoma ceanothi* Cockerell, sp. n.

Male. Length about 5.5 mm.; black, the head large, globose, with prominent eyes; face with very long white hair, that on front and vertex flavescent; cheeks broadly rounded, with thin white hair; vertex finely punctured; ocelli rather large; mesothorax finely and densely punctured, only moderately shining, scutellum similarly punctured; area of metathorax dull, with a shining rim; wings greyish hyaline (not reddish as in *Chelostoma minutum*), nervures brown, stigma dark reddish; legs black, with scanty white hair; thorax dorsally with very long erect yellowish hairs, only noticeable in certain lights; abdomen shining, finely punctured, without bands, the tergites with very short thin hair, the venter with abundant long white hair.

Underwood's Cabins, Redwood Highway, at *Ceanothus cuneatus* (Hooker). This is the type, but a second specimen was obtained by H. H. Keifer at Mill Valley, Marin Co., March 15, 1925. There is also one from Yorkville, Mendocino Co., May 1, 1924 (E. P. Van Duzee.)

## OSMIA LIGNARIA Say.

Meyer's auto camp, five at *Lupinus arboreus* Sims, variety; Perrott Grove, west boundary, one at *Rubus*. Also one at Chico, April 13. All females.

## ANDRENIDÆ

*Andrena ablusula* Cockerell, sp. n.

Female. Length 8.5-9.5 mm., anterior wing 8; rather slender, head and thorax appearing black, but sides of face evidently or obscurely green, mesothorax and scutellum with a faint greenish tint, the almost yellowish-green scutellum contrasting with the blue-black metathorax; mandibles, antennæ and tegulæ black, or the tegulæ with a brownish mark; legs black; abdomen dark olive green, the margins of the tergites very narrowly whitish. Hair of head and thorax long and erect, pale and dull, slightly flavescent, light red on mesothorax and scutellum; legs with pale hair, reddish on inner side of tarsi, black below hind knees; tergites 2 to 4 with very thin, weak, but evident, white hair-bands, broadly interrupted in middle; hair at apex of abdomen soot-color. Process of labrum rather narrowly truncate; third antennal joint slender, about as long as next two combined; facial quadrangle much broader than long; facial foveæ black (the outer part pale reddish, seen from above), not broad, about a third as broad as distance between eyes and antennæ, ending below at about level of antennæ, separated from orbits only by a line; clypeus sparsely but distinctly punctured, appearing dull seen from in front, but seen from below the lower half is polished, and there is a polished line along upper edge; mesothorax dull, with weak widely separated punctures; scutellum a little shining anteriorly; area of metathorax dull and granular; wings long, dusky hyaline, distinctly darker at apex; stigma large, uniform dark red; nervures rather light brown; basal nervure meeting nervulus; second cubital cell receiving recurrent nervure well beyond middle; first intercubitus not near stigma; hind tibiæ long and slender; hind basitarsi longer than the other joints together; tibial scopa long and loose, the hairs simple, but hairs on hind margin of tibia more or less branched; spurs almost colorless; abdomen shining, without distinct punctures, bases of tergites 2 to 4 dull; second tergite depressed fully a third; venter polished, greenish, the sternites with more or less evident depressions or pits.

Underwoods (type locality), at *Ceanothus cuneatus* (Hooker), 1 female (Cockerell); Garberville, Humboldt Co., April 19, at *Cercocarpus betuloides* Nuttall, 2 females (Cockerell). In Viereck's table of northwestern species, it runs out next to *A.*

*piperi* Viereck, which is smaller, and quite different. In other tables it goes near *A. subtrita* Ckll. and *A. coloradino* Vier. & Ckll., but it is not much like either. It differs from *A. candida* Sm., by the black metathorax, green abdomen, and feeble bands.

In Perkins' table (1919) it runs to 17, and agrees in having the first tergite rugulose (actually minutely tessellate) between the punctures, and the abdominal bands formed only on the hind margins of the apical depressions of tergites. This places it in the vicinity of *A. ovatula* Kirby, *A. wilkella* Kirby and *A. similis* Smith (subgenus *Tæniandrena* of Hedicke), but it differs by the metallic color, and is less robust, being shaped about as in the males of this group.

#### *Andrena angustella* Cockerell, sp. n.

Male. Length about 8 mm., anterior wing slightly over 7; black, with narrow fusiform abdomen, regularly and conspicuously narrowed basally; clypeus with a very large, polished, pale yellow patch, leaving the lateral and upper margins broadly black, the yellow also slightly notched on each side, and deeply and broadly notched above in middle; hair of head and thorax erect, very long, dorsally pale red (some black hairs about ocelli), pale red also on face, but black at extreme sides, dull white on cheeks and lower part of pleura; head extremely broad; malar space very small; cheeks shining, greatly broadened, with a prominent but obtuse angle above on level of middle of eye; mandibles with no basal tooth, but bidentate; process of labrum bidentate; front dull, with a shining band next to orbits; cheeks at top highly polished, abruptly contrasting with the entirely dull vertex, which is broad and flat; antennæ entirely black, flagellum very long, shining; third antennal joint dull black, about as long as fourth; thorax small; mesothorax entirely dull, with a shining median line; scutellum large, with two slightly shining swellings in front; postscutellum with a little pit in middle of upper border; area of metathorax entirely dull, without evident sculpture; tegulæ black; wings faintly dusky; stigma large, clear pale amber; nervures pale; basal nervure meeting nervulus; second cubital cell conspicuously narrowed above, receiving recurrent nervure about middle; first intercubitus not near to stigma; legs slender and black, with pale hair (creamy white on inner side of tarsi), last tarsal joint pale red; spurs white; abdomen with first tergite dull, hardly shining (microscopically striate and tessellate, with scattered very long hairs); second rather more shining, very feebly depressed about one-fourth; remaining tergites polished; tergites 2 to 5 with thin, weak, slightly fulvescent hair-bands, hair at apex pale fulvescent; apical

plate (eighth sternite) very broadly truncate, slightly emarginate, in the style of *A. wheeleri* Graenicher.

Underwoods (Redwood Highway) at *Fragaria*, latter half of April, 1 male (Cockerell).

*Variety a.* Hair of head and thorax above white; light hair of face white or yellowish white; clypeal mark only feebly notched in middle above; the slender abdominal bands white; Garberville, April 19, at *Cercocarpus betuloides* Nuttall, 1 male (Cockerell); eight miles north of Ukiah, April 21, at *Ranunculus occidentalis* Nuttall, 1 male (Cockerell). The clypeal mark recalls that *A. bradleyi* Viereck and *A. saccharina* Ckll. & Rohwer, but these have the malar space large. There is some resemblance to the Californian *A. macrocephala* Ckll., which has a broader, though fusiform, abdomen. The position of the tubercle of labrum suggests *A. marginata* (Fabricius).

#### *Andrena anisochlora* Cockerell, sp. n.

Female. Length about 9 mm., anterior wing 7; head (with mandibles and antennæ), thorax and legs black, abdomen broad and shining, obscure dark green, the depressed portions of the tergites black, with a linear pallid margin; third antennal joint longer than next two together on upper side, but not on lower; face very broad (width about 2 mm.); hair of head long and black, except yellowish white on occiput; process of labrum truncate; malar space evident but very short; facial foveæ black, narrow, separated from eye by a shining line, ending below at about level of antennæ; clypeus entirely dull, the surface microscopically transversely striate; thorax with long dull whitish hair, faintly creamy dorsally, but with no black; mesothorax dull, scutellum a little shining anteriorly; area of metathorax dull, the whole metathorax with long erect hair; mesopleura strongly convex, but rounded, not submarginate, below; tegulæ small, very dark brown; wings hyaline, faintly dusky; stigma red, rather narrow; nervures dark brown; basal nervure falling short of nervulus; second cubital cell nearly square, receiving recurrent nervure a little beyond middle; first intercubitus not near to stigma; legs with pale hair; hind tibial scopa large and compact, the hairs simple but with a granular appearance, on under side straight; hind basitarsi broad; first tergite polished on disc, but microscopically tessellate, without a differentiated apical depression; second tergite depressed less than a third; no hair-bands; hair at apex pale sooty.

Mark West Springs, April 23, 1 female (W. P. Cockerell). On the hind legs, and sides of metathorax, it carries a large amount of pale pink pollen. The flower visited was *Montia gypsophil-*

*oides* (Fischer & Meyer). By the structure of the thorax, this has some affinity with the subgenus *Gonandrena*. It possibly has a light clypeus in the male, in the manner of *A. unacula* Ckll. The black hair on face suggests *A. nigrocærulea* Ckll., but that has black hair on pleura and is otherwise different. *A. amplificata* Ckll. is rather similar, but *A. anisochlora* is smaller and quite different by the dull clypeus. There are several points of resemblance to the European *A. lapponica* Zett., noticeably the covering of erect hairs on metathorax. It should therefore fall in strictly typical *Andrena* (subg. *Hoplاندrena* Perez)

#### ANDRENA AURICOMA Smith

Yorkville, Mendocino Co., May 17, 1928. 1 female (Van Duzee)

#### ANDRENA CANDIDA Smith

Kearney Mesa, near San Diego, at flowers of *Phacelia parryi* Torrey, 3 females, March 17, 1935 (W. P. Cockerell, B. A. Henderson); Garberville, Humboldt Co., April 19, at *Cercocarpus betuloides* Nuttall, 1 female (Cockerell).

It is extraordinary that this species should visit such different flowers, in such totally diverse environments. A female was also taken at Chico, April 13, (Cockerell).

#### ANDRENA CARLINIFORMIS Viereck & Cockerell

Inverness, May 21, 1910, 1 female (E. C. Van Dyke). It differs from the type by having no white hair in middle of metathorax, and outer intercubitus without a distinct double curve; it thus approaches *A. perimelas* Ckll., which may not be a distinct species.

#### ANDRENA CEANOTHINA Cockerell, sp. n.

Female. Length about 10 mm., anterior wing 7.7 mm., black, including antennæ, mandibles, legs and tegulæ; third antennal joint about as long as next two together on lower side; process of labrum broadly truncate, with a pit or depression in the middle, facial foveæ very broad, black, ending obtusely below at about level of antennæ; face broader than long, but not excessively broad; clypeus convex, polished, with very strong but well separated punctures; vertex dull; hair of head long, pale fulvous, a little brown behind

ocelli; hair of thorax above long, deep fox-red, on pleura and metathorax dull whitish; mesothorax dull, scutellum shining anteriorly, without bosses; area of metathorax entirely dull and without evident sculpture; wings hyaline, a little dusky, the outer margins darker; stigma and nervures dilute sepia, the stigma with a dark margin; basal nervure meeting nervulus; second cubital cell large and square, receiving recurrent nervure a little beyond middle; legs with whitish hair, but black on the copious hind tibial scopa behind, the hairs of scopa simple; hind basitarsi rather broad; spurs brown; abdomen dullish, with extremely minute punctures; second tergite depressed a little more than a third; tergites 2 to 4 with rather broad bands of yellowish white hair, that on second weak in middle; hair of fifth tergite dark grey; venter finely but distinctly punctured, not polished, the hair dull whitish.

Underwood's Cabins, Redwood Highway, at *Ceanothus cuneatus* (Hooker), 1 female, last half of April (Cockerell). In appearance, this is so similar to *A. lupini* Ckll., that I had at first considered it identical. Nevertheless, it is not a *Pterandrena*, and is probably not very closely related. It may be compared with the Rocky Mountain *A. vierecki* Ckll., which is smaller, with facial foveæ light brown, and the hind tibial scopa, while mainly simple, showing plumose hairs posteriorly toward apex. There is a strong resemblance to *A. opaciventris* Ckll., which has greyish-brown facial foveæ, and paler hair at end of abdomen. (In *A. opaciventris* the fulvous hair bands are on tergites 2 to 4, not 3 to 5, as stated).

A male taken at the same time and place, but at *Ceanothus foliosus* Parry, appears to belong to *A. ceanothina*, although the abdomen lacks hair-bands, and the wings are clear hyaline, only a little dusky at apex. It is about 9 mm. long, with very broad face, the clypeus with a large beard of pale fulvescent hair, but abundant long black hair at sides of face; cheeks rounded, quite ordinary; flagellum very long, black; mesothorax with pale reddish hair, brighter red on scutellum; spurs very pale reddish; first and second tergites dull; traces of bands at extreme sides of second and third tergites; hair at apex of abdomen pale fulvous. It is easily known from *A. ribifloris* Vier. & Ckll., and related species, by the dull second tergite. A second male, agreeing with the above, is from Mill Valley, Marin Co., Feb. 28, 1926 (Van Duzee).

*Andrena cercocarpi* Cockerell, sp. n.

Female. Length about 7.5 mm., anterior wing 5; hind tibial scopa simple; third antennal joint about as long as next two together. A small black species, flying with *A. orthocarpi* Ckll, and exceedingly like it in most respects, but differing thus: flagellum red beneath; mesopleura convex, ordinary; wings greyish; stigma narrower, with a dark border; second cubital cell receiving recurrent nervure well beyond middle; abdomen dull, hair-bands creamy-white; depression of second tergite very short, less than one-fifth; whole surface of tergites, under microscope, showing an excessively minute but very sharply defined tessellation. The hair on inner side of hind basitarsi is creamy white.

The dusky stigma, reddish facial foveæ, and short depression of second tergite readily separate it from *A. nasonii* Rob.

Garberville, April 19, at *Cercocarpus betuloides*, 1 female (Cockerell).

## ANDRENA COMPLEXA Viereck

Mark West Springs, April 23, at *Ranunculus*, 6 females. They agree with one from Corvallis, Oregon, April 22, determined by Viereck. This is a topotype.

The following notes were made at the Citrus Experiment Station at Riverside:

*Andrena cærulea acrypta* Viereck, female, head and thorax with much erect long dull white hair; flagellum dusky reddish beneath; mesothorax dull; stigma large, light reddish with dark margin; basal nervure meeting nervulus or barely short of it; second cubital cell very broad, with parallel sides, receiving recurrent nervure before middle; middle basitarsi very broad; head and thorax blue, abdomen olive green; second tergite in middle depressed rather over a third; abdomen shining, very finely punctured, hair at apex dark brown. Timberlake notes that it has a plumose scopa.

This is from a cotype. Compared with *A. complexa* in the collection (det. Viereck, but not cotype), I thought it was the same species. Viereck (in litt.) long ago stated that *A. acrypta* and *A. erigenoides* were identical with *A. cærulea* Smith, although in his table the latter was said to have the abdomen black. I have a female labelled *A. erigenoides*, I believe determined by Viereck, from Victoria, B. C., May 27, 1916 (R. C. Treherne), and it has



the abdomen olive green. It is exceedingly like *A. complexa*, but can be distinguished by the abundant black hair on upper half of pleura.

The following notes on a female (det. Timberlake) labelled *A. cærulea complexa* were also made at the Citrus Experiment Station. The specimen is from Berkeley, California. Dark green; stigma dusky reddish with dark margin, second cubital cell receiving recurrent nervure about middle; facial foveæ black, rather narrow, well separated from eye; clypeus black, entirely dull; mesothorax and scutellum dull, scutellum a little shining anteriorly. There was also a male; tergites subfasciate at sides, and much black hair at sides of face.

Whether this series represents a single variable species (*A. cærulea* Smith), or a group of closely allied species, cannot at present be determined.

*Andrena supervirens* Cockerell, 1924, is identical with *A. complexa*.

Since writing the above, I have received a long series of female *A. complexa* from the California Academy, with the following data:

Mark West Springs, April 23, at *Ranunculus*, seven (Van Duzee); Yorkville, April 24 and May 17, six (Van Duzee) Meyers, five miles north of Miranda, April 18 at *Ranunculus*, two (Van Duzee); Point Reyes, March 22, one (H. H. Keifer); Muir Woods, May 4, (Van Dyke); Yolanda, March (C. L. Fox); Fairfax, April 13 (Van Duzee); Ross, Marin Co., March 31 (Van Duzee); Fort Baker, March 15, (C. L. Fox).

#### ANDRENA EPILEUCA Cockerell

Garberville, at *Cercocarpus betuloides* Nuttall, one male.

#### ANDRENA ERECTA Viereck

Meyer's auto camp, at *Lupinus arboreus* Sims, variety, 1 female. Agrees with a paratype from Victoria, B. C., June 10, 1923, (K. F. Auden).

#### ANDRENA FULVIHIRTATA Viereck and Cockerell

Underwoods, at *Ceanothus cuneatus* (Hooker), April, one female. (Cockerell). This differs a little from the Colorado type

in that the basal nervure falls a little short of nervulus, and the second cubital cell receives recurrent nervure very slightly beyond middle, but I cannot venture to separate it. The hair of thorax above (especially the scutellum) is very bright red. It is easily known from *A. vierecki* Ckll. by the polished abdomen. It is close to *A. physariæ* Ckll., but less robust, wings not darkened at apex, nervures darker, abdominal hair-bands redder, and clypeus more coarsely punctured, with a median ridge. The facial foveæ appear pale reddish seen from above, but seen from in front they look black, overlapped by spreading fulvous hairs.

ANDRENA (TRACHANDRENA) LIMAREA Viereck

Near Prairie Creek, Humboldt Co., April 16, 1 male (Cockerell). Compared with a specimen from Washington State, the hind basitarsi are shorter with white instead of fulvescent hair on inner side.

*Andrena* (*Pterandrena*) *lupini* Cockerell, sp. n.

Female. Length about 11.5 mm., anterior wing nearly 9; black, including mandibles, legs and antennæ, tegulæ very faintly brownish; eyes pure black; face and top of head with long fulvous hair, on cheeks paler, the long hairs overlapping ocelli sometimes dark; third antennal joint about as long as next three together; malar space very short; process of labrum forming a low triangle, with a nipple-like summit; face exceedingly broad (over 2 mm. between orbits), the facial foveæ black, very broad, separated only by a line from orbits, ending very obtusely a little below level of antennæ; clypeus broad, convex, shining, with thinly scattered weak punctures, and no median ridge; mesothorax and scutellum covered with long fox-red hair, the surface dull, the scutellum with a pair of somewhat shining prominences; area of metathorax entirely dull, without evident sculpture; hair of pleura and metathorax pale, slightly flavescent; wings dusky; stigma long, pale dull red, nervures dark brown; basal nervure meeting nervulus; second cubital cell large, receiving recurrent nervure distinctly beyond middle; legs with pale hair, light red on inner side of tarsi, middle femora with a brush of stiff red hair beneath, hind tibial scopa strongly plumose; hind basitarsi long and slender; spurs very pale flavescent; abdomen shining but not polished, covered with extremely minute punctures, second tergite depressed less than a third; tergites 2 to 4 with entire, not very broad, bands

of appressed fulvescent hair; fringe of fifth tergite pale brownish grey (dilute chocolate); venter polished, with thin white (slightly yellowish) hair-bands.

Meyer's auto camp, Humboldt Co., at *Lupinus arboreus* Sims, variety, 3 females, last half of April, 1935 (Cockerell). Superficially very like *A. ceanothina* Ckll., but at once separated by the weak sculpture of the clypeus. In my key to species with red hair on scutellum, it runs near *A. pronitens* Ckll., which is much smaller, with a highly polished clypeus, and white hair at end of abdomen.

#### ANDRENA MANITOUENSIS (Viereck and Cockerell)

Meyer's auto camp, Humboldt Co., at *Salix*, one male. This species was described (1914) from Colorado, as a subspecies of *A. washingtoni* Cockerell. It was originally found on *Ribes*, but I do not at present know how to separate the Californian insect. The head seen from in front is very like that of *A. monogonoparia* Viereck, from Nevada, but that species has different wings, no red hair on thorax, and dull second tergite. At Underwoods, at *Ceanothus cuneatus*, I took a smaller male which I had at first separated as distinct but it seems to have no specific characters. This specimen, compared with a Colorado *A. bisaliciis* Viereck, differs by the more dusky wings, with darker stigma, dark tegulæ, and hind margins of tergites not pale. Compared with *A. fernaldiella* Vier. & Ckll. it differs by the long white beard on clypeus, the stouter, black flagellum, dark marginal stigma and larger abdomen.

#### ANDRENA MICRANTHOPHILA Cockerell

Ross, Marin Co., April 28, 1918, 1 female (Van Duzee).

#### *Andrena* (*Micrandrena*) *microchlora subalia* Cockerell, subsp. n.

Female. Length about 6.5 mm., anterior wing 5; head and thorax dark olive green, the clypeus black with a rosy tint at upper end, the metathorax very dark bluish green; head broad, the facial quadrangle conspicuously broader than long; mandibles and antennæ black; facial foveæ narrow, their pubescence white, the lower end narrow, at about lower level of antennal sockets; clypeus dull, with scattered punctures, the surface finely transversely stri-

ate (as seen under microscope); process of labrum large, truncate, the sides abruptly descending; third antennal joint near as long as next three combined, the fourth being very short, wider than long; head and thorax with thin dull white hair; mesothorax and scutellum somewhat shining but not polished; area of metathorax dull and granular; tegulæ almost black, with only a faint brown tinge; wings hyaline, slightly dusky, stigma dusky red, nervures brown; basal nervure falling short of nervulus; second cubital cell broad, receiving recurrent nervure about middle; first intercubitus almost touching stigma; legs black, with white hair, only faintly yellowish on inner side of tarsi; hind basitarsus rather broad; tibial scopa short; abdomen olive green, shining; tergites 2 to 4 with narrow white hair-bands, interrupted on first two; hair at apex mostly pale, but more or less brownish or sooty in middle; second tergite depressed about or nearly a third.

Near Lower Lake, at yellow umbellifer (type locality), 2 females (Cockerell); eight miles north of Ukiah, at *Ceanothus cuneatus*, 4 females (W. P. Cockerell); Burns Valley, at *Rhus*, 1 female (W. P. Cockerell); Underwoods, at *Ceanothus cuneatus*, 1 female (Cockerell). All in last half of April. Nearest to *A. microchlora* Ckll., from Colorado, but the face is considerably broader (though variable), and the margins of the tergites are less evidently pallid. The resemblance is so close that I give the Californian insect only subspecific rank. The male of *A. microchlora* has the clypeus yellow, with two black dots.

*Andrena* (*Micrandrena*) *nitidicornis* Cockerell, sp. n.

Male. Length about 5.7 mm., anterior wing 4.4; head, thorax and abdomen very dark green, mandibles, antennæ, tegulæ and legs black; clypeus with a large transverse cream-colored patch, shaped like an inverted tea-cup, with a transverse black bar on its disc, leaving the upper and lateral margins of clypeus broadly dark; facial quadrangle broader than long; anterior orbits with a shining margin; clypeus shining, front dull; clypeus with a long white beard, and long white hair on cheeks, but hair of head otherwise black or blackish; third antennal joint about as long as fourth; flagellum long, shining, moniliform; cheeks flattened, moderately broad, not angular; hair of thorax long and white, dull fulvescent on scutellum; mesothorax dull, moderately shining on disc. Scutellum more shining; wings hyaline, faintly dusky; stigma large, very dark brown, nearly black; nervures brown; basal nervure falling far short of nervulus; second cubital cell large, receiving recurrent nervure a little before middle; first intercubitus

reaching stigma; legs with pale hair, spurs brown; abdomen dullish dark green, hind margins of tergites narrowly more or less reddish; hair-bands rudimentary: apex with white hair.

Garberville, Humboldt Co., April 19, at *Cercocarpus betuloides*, 1 male (Cockerell). Easily known from *A. microchlora* Ckll. by the restricted clypeal mark, the dark stigma and the position of the first recurrent nervure. Also the joints of the flagellum are very much longer than in *A. microchlora*. It is possible, but I think not probable, that this is the male of *A. chlorogaster* Viereck, insufficiently described from Oregon.

#### ANDRENA (PLATANDRENA) NUDISCOPA Viereck

Meyer's auto camp, Humboldt Co., at *Salix*, April, 1 female (W. P. Cockerell); eight miles north of Ukiah, at *Ceanothus cuneatus* (Hooker) April 21, 1 female (W. P. Cockerell). Compared with a specimen of *A. nudiscopa* determined by Viereck, from Fort Collins, Colo., June 12, 1900 (Gillette), the Californian specimens differ by the black flagellum and tegulæ. The species was described from Corvallis, Oregon, April, May and June. Viereck (in litt.) stated that his *A. angustitarsata* was the same species; if this is the case, that name has a month's priority. *A. angustitarsata* came from Washington State, *A. mustelicolor huardi* Viereck is very closely allied, but has the hind basitarsi shorter and broader, and the broad facial foveæ entirely white-haired. Malloch remarks (in litt.) that various species have the cuneate type of hind tibiæ considered distinctive of *Platandrena*, and cites as examples *A. wheeleri* Graen., *A. fragariana* Graen. and *A. ziziæformis* Ckll., the last two pertaining to the group *Micrandrena* Ashmead. A European species with this character is *A. dorsata* Kirby, placed by Hedicke in the subgenus *Simandrena* Pérez.

At the Citrus Experiment Station, I found *A. angustitarsata* from Corvallis, determined by Timberlake. I noted: facial foveæ white, rather broad; clypeus very finely punctured, not ridged; occiput with long white hair; scutellum with yellowish hair; tegulæ posteriorly red, and rather produced (approaching the condition seen in *A. harveyi* Vier.) wings brownish hyaline; second cubital cell narrowing above, receiving recurrent nervure

before middle; stigma large and red; abdomen perfectly dull, with interrupted white hair-bands.

*Andrena* (*Platandrena*) *opacibasis* Cockerell, sp. n.

Female. Length about 8.5 mm., anterior wing 6.6; black, with entire pure white hair-bands on tergites 2 to 4; hair on fifth dark sooty-brown; antennæ and tegulæ black; facial foveæ broad, white, the upper part brown; process of labrum obtusely rounded; third antennal joint about as long as next two together. The hair of head and thorax is dull white, very faintly fulvescent dorsally, evidently brown just behind ocelli; labrum highly polished; clypeus entirely dull, excessively minutely punctured, with no smooth line or ridge; front dull, with a shining median line; mesothorax dull, but scutellum shining on disc, somewhat bigibbous; area of metathorax entirely dull; sides of metathorax regularly fringed with very long curved hairs; wings faintly brownish, stigma large and red, nervures brown; basal nervure falling short of nervulus (meeting in *A. nudiscopa*); second cubital cell moderately broad, receiving recurrent nervure in middle; legs with mainly white hair, pale reddish on inner side of tarsi and a pale red band on hind tibiæ posteriorly; spurs whitish; hind tibiæ cuneate (but not excessively broad at end), much broader than the basitarsi; hair of hind tibiæ mostly simple, but dense and plumose posteriorly (in *A. nudiscopa* the hairs on anterior face are long, curved at end, with a few slender branches); first tergite dull, with a short marginal band of white hair at each side; the other tergites somewhat shining, but not at all polished, with only scattered, excessively minute, piliferous punctures; second tergite in middle depressed about a third; the pure white hair-bands are dense, and narrower than in *A. nudiscopa*; venter shining, without much hair.

Near Lower Lake, April, at yellow umbelliferous flowers, 1 female (Cockerell.) The locality is north of San Francisco. This species is so like *A. nudiscopa* Viereck, that I did not separate it at first. The most obvious characters are the narrow abdominal bands, and the dark sooty hair at end of abdomen. The hind tibia is distinctly less broadened at end. The dull first tergite readily separates it from *A. pallidiscopa* Viereck and *A. solidaginis* Rob. *A. opacissima* Ckll., from Idaho, differs by the very long hair of cheeks, broad second cubital cell receiving recurrent nervure before middle, and broader abdominal bands. It visits *Salix*. I refer this species to *Platandrena*, because it is obviously closely allied to the members of that group; but the

hind tibiæ are hardly cuneate enough to fit the diagnosis. They are about 560 microns wide at end, the basitarsi being 352 wide near base.

ANDRENA OPACIVENTRIS Cockerell

Meyers, 5 miles north of Miranda, Humboldt Co., April 18, 1935, at *Vaccinium ovatum* Pursh., 1 female (Van Duzee).

*Andrena* (*Platandrena*) *orthocarpi* Cockerell, sp. n.

Female. Length about 7.5 mm., anterior wing 5; black, without any green tint, the antennæ, mandibles, tegulæ and legs black; hair of head and thorax dull white, not dense, very faintly fulvescent on scutellum; metathorax exposed in middle and base, on each side, abruptly limited, a dense scopa of long curled white hairs, used to carry pollen; facial quadrangle much broader than long; process of labrum short and broad; third antennal joint about as long as next two together; clypeus and supraclypeal area dull and rugulose, the microscope showing large piliferous punctures on clypeus; facial foveæ rather broad but very indistinct, brownish, appearing black in some lights; mesothorax and scutellum dull, a little shining but not polished on disc; scutellum slightly depressed in middle; postscutellum large; base of metathorax entirely dull, without evident sculpture; mesopleura shining, flattened, more or less concave, its lower part with a very strong transverse ridge; wings dusky hyaline, faintly reddish; stigma large, clear light red; nervures pale; basal nervure meeting nervulus; second cubital cell rather small or narrow, receiving recurrent nervure about middle; first intercubitus not close to stigma; legs with pale hair, distinctly red on inner side of tarsi; floccus on hind trochanters very well developed; spurs very pale; hind tibiæ very broad at end, twice as broad as basitarsi; tibial scopa dull white, the hairs simple; abdomen broad, shining, tergites 2 to 4 with well defined pure white hair-bands, very broadly interrupted on second and narrowly on third; hair at apex light grey; second tergite in middle depressed rather more than a third, but the depression very weak, third depressed about a third; margins of tergites very narrowly pallid; surface of abdomen, as seen under microscope, with a very minute weak reticulation.

Garberville, Humboldt Co., April 19, 4 females (Cockerell). The type and one other at *Orthocarpus faucibarbus* Gray.\*, one at *Cercocarpus betuloides*, one at *Blennosperma californicum*

\*Jepson says of this: "Corolla sulphur yellow or pinkish white or white." The plants at Garberville had the lip bright yellow, or the whole flower white, or all the corolla yellow. No doubt these forms are Mendelian alternates.

Torrey & Gray, the last growing in a marshy place by the creek. One specimen, with a dusky stigma, is from Perrott Grove, on the introduced *Brassica campestris* L. This is closely allied to *A. nasonii* Robertson (type of subgenus *Platandrena* Viereck), having the same sort of mesopleura. It is, however, easily separated by the facial foveæ and more shining abdomen.

#### ANDRENA PRONITENS Cockerell

Garberville, at *Cercocarpus betuloides*, 2 females, April 19 (Cockerell). The hair of the abdominal bands is distinctly longer than in the type from Colorado, and the first tergite is more shining. The tibial scopa is plumose.

#### *Andrena ripariella* Cockerell, sp. n.

Male. Length about 7.5 mm., anterior wings 6.2; black including mandibles, antennæ (flagellum very faintly brownish), tegulæ and legs; third antennal joint a little longer than fourth; mandibles bidentate; process of labrum narrow, shallowly emarginate, the apical part broadly thickened; flagellum long and thick, submoniliform; cheeks broad but rounded; facial quadrangle conspicuously broader than long; clypeus very coarsely and strongly punctured; hair of face and front long and black, a little light hair between antennæ; long white hair on middle of vertex and lower part of cheeks, but cheeks otherwise with black hair: hair of thorax very long, black at sides and mainly so on scutellum, on mesothorax white mixed with black, on metathorax black in middle but white at sides, white in region of axillæ; mesothorax dullish, with weak punctures, moderately shining, but not polished in middle; scutellum shining in middle, bigibbous; area of metathorax granular and dull; wings brownish hyaline; stigma very large, very dark reddish-brown; nervures rather pale brown; basal nervure falling a little short of nervulus; second cubital cell contracted above, receiving recurrent nervure at about beginning of last third; legs with whitish hair, the long hair on front femora behind blackish; hair on inner side of tarsi only slightly flavescent; spurs dull white; abdomen shining, with excessively minute punctures; pure white hair-bands, broadly interrupted in middle, on tergites 2 to 4; apex with sooty hair; second tergite depressed about one fourth, the apical depression very narrow.

Meyer's auto camp, Humboldt Co., latter half of April, one resting on a bank (W. P. Cockerell). Very close to the Rocky Mountain *A. nigrihirta* (Ashmead), but clypeus more coarsely



punctured, wings darker, stigma and nervures much darker, and abdomen with interrupted white bands. The head seen from in front looks just like that of *A. nigrihirta*. *A. micranthophila* Ckll., has the hair of face all black, but thorax above with red hair, and abdomen without bands. In the Californian fauna, *A. knuthiana* Ckll. is similar, but has the apical depression of second tergite much larger, stigma redder and third cubital cell very broad above. In the table of British species by Perkins (1919) it runs nearest to *A. gwynana* Kirby, but there are no black hairs projecting beneath third antennal joint. The head, seen from in front looks like that of *A. gwynana*, but the coarsely punctured glistening clypeus of *A. ripariella* is quite different. *A. gwynana* is said to be the true *A. bicolor* (Fabr.) and is the type of Hedicke's subgenus *Euandrena*.

*Andrena semotula* Cockerell, sp. n.

Male. Length about 6.5 mm., anterior wing 5; black, the head and thorax with long spreading white hair, sides of face and front with black hair; in region of antennæ and on thorax above the hair has a faint, scarcely noticeable yellowish tint; process of labrum broad and truncate, the thickened apex appearing binodose; mandibles simple; antennæ entirely black, the flagellum very long, moniliform; third antennal joint shorter than fourth; clypeus with a white beard, which is rather short and not brilliant; surface of clypeus moderately shining, finely punctured, with no smooth line, an obtuse ridge crosses the clypeus below the middle; cheeks rounded, with long white hair below, posterior orbits shining; facial quadrangle conspicuously broader than long; mesothorax dull, moderately shining on disc, but not polished; scutellum shining on disc, not bigibbous; area of metathorax dull and granular; when the thorax is seen from the side the metathorax appears dull, but a shining band extends along its lower border; tegulæ shining black; wings hyaline; stigma large, dark reddish (more distinctly red in specimens from Underwoods); nervures brown; basal nervure falling short of nervulus; second cubital cell broad (variable, from broader than high to higher than broad), receiving recurrent nervure about middle; first intercubitus not far from stigma; legs slender, with white hair, very pale yellowish on inner side of tarsi; spurs light red; abdomen polished, but second tergite dullish except the apical depression, and distinctly though sparsely punctured, depression occupying less than a third; thin inconspicuous white hair-bands at sides only of tergites 2 to 4 and fifth with a very thin fringe right across; apex with white hair; extreme apex (eighth ventral plate) truncate, distinctly subemarginate, with a

long fringe of curved hairs on each side, the style much as in *A. braunsiana* Friese.

Eight miles north of Ukiah, April 21, 1935, at *Ceanothus cuneatus* (Hooker), 1 male collected by W. P. Cockerell. Also from Underwoods, 3 males, at *C. cuneatus* and *C. foliosus* Parry (Ckll.) and from Meyer's auto camp, Humboldt Co., at *Salix*, 4 males (W. P. Cockerell). Related to *A. candidiformis* Vier. & Ckll., and *A. subcandida* Viereck, (det. Vier.) the three being separable thus:

Stigma dark brown or reddish; flagellum shining black.....	
.....	<i>semotula</i> Ckll.
Stigma pale reddish; flagellum brown beneath.....	1
1. Second cubital cell broad, its upper basal corner near stigma; basal nervure falling short of nervulus.....	<i>candidiformis</i> V. & C.
—. Second cubital cell narrow, its upper basal corner separated from stigma by a distance about equal to side of second cubital on marginal; basal nervure meeting nervulus.....	
.....	<i>subcandida</i> Viereck

The *A. candidiformis* before me was determined by Viereck, and is labelled "Colo. 2112, Gillette." It is one of the original specimens. The *A. subcandida*, also determined by Viereck, is from Florissant, Colorado, at *Ribes vallicola* Greene (more correctly *R. inermis* Rydbg., var. *vallicola*), June 11, 1907 (S. A. Rohwer). As *A. subcandida* was based on the female from Seattle and Vancouver I., and was said to have the abdomen with metallic colors and the stigma dark, it is practically certain that Viereck's identification of the Florissant insect is incorrect.

In Perkins' Key *A. semotula* runs nearest to *A. spinigera* Kirby, but that is a very much larger and quite different insect. The short third antennal joint and flagellum shining beneath in the male are characters of the subgenus *Hoplandrena* Perez, which is known by various species, from England to Japan.

#### *Andrena* (*Micrandrena*) *solutula* Cockerell, sp. n.

Female. Length about 6.8 mm., anterior wing 5.6; head and thorax black with faint, hardly recognizable, suggestions of greenish or brassy, the mesothorax essentially black; hair of head and thorax thin and whitish; mandibles black; flagellum obscurely brownish beneath; third antennal joint about as long as next two together, the fourth about as long as fifth; process of labrum broad and low, rounded; clypeus dull, with scattered minute punctures on

a minutely tessellate surface; supraclypeal area shining when seen from below; facial foveæ black (somewhat brownish seen from above), very short, ending broadly well above level of antennæ; mesothorax and scutellum a little shining, not polished; area of metathorax dull, showing a V-shaped impression; tegulæ black or faintly brownish; wings hyaline, slightly dusky; stigma red, very large; nervures pale brown; basal nervure falling far short of nervulus; second cubital cell large, receiving recurrent nervure almost or quite at end; first intercubitus almost reaching stigma; legs black, with whitish hair; abdomen dark green, shining, the hair-bands extremely weak and hardly noticeable; hair at apex sooty.

Petrified Forest, Sonoma Co., April 23, (type locality), at *Ceanothus foliosus*, 5 females (Cockerell); Underwood's, at *Ceanothus cuneatus*, 1 female (Cockerell).

At first sight this looks like *A. microchlora subalia* Ckll., but the black mesothorax and different venation at once separate it.

#### ANDRENA TRANSNIGRA Viereck

Yorkville, Mendocino Co., May 8, 1935, 1 female (Van Duzee).

#### *Andrena vandykei* Cockerell, sp. n.

Male. Length about 7 mm., anterior wing 5.7; black, the legs and abdomen slightly brownish, mandibles faintly reddish apically; flagellum long, moniliform, obscure reddish brown; tegulæ shining, very dark brown; clypeus very short and broad, with a transverse broad light yellow band which does not nearly reach lateral corners; hair of head and thorax long and spreading, not dense, dull whitish on cheeks and sides of thorax and behind ocelli, largely greyish on thorax above, greyish black on face and front; wings long, hyaline, very faintly dusky apically; stigma very large, dusky red, nervures brown; basal nervure falling short of nervulus; second cubital cell large, approximately square, receiving recurrent nervure not far from end, its upper basal corner near to stigma; third cubital cell rather short, receiving recurrent nervure very near end. Head very large, extremely broad; front and vertex dull, but clypeus, sides of face and cheeks shining, the clypeus with small sparse piliferous punctures; malar space short but evident, shining, its lower end with a long slender spine; mandibles excessively long, curved, scimitar-like, without any inner tooth, the extreme base beneath produced into an angle; cheeks very broad, convex, the broadest part much above middle of eye; process of labrum very large, very broadly truncate, the margin slightly

undulate, the width of the structure almost as great as the distance between antennæ; third antennal joint longer than the short fourth but not quite as long as fourth and fifth combined; thorax small, moderately shining dorsally; area of metathorax dull, a little shining laterally, without evident sculpture (the microscope shows a minutely tessellate surface); abdomen fusiform, shining, without hair-bands, margins of tergites pallescent, second tergite with no distinct apical depression; venter with thin short white hair.

Cypress Ridge, Marin Co., April 6, 1921, 1 male (E. C. Van Dyke). A very distinct species, probably forming a new subgenus. *A. perarmata* Ckll. and *A. fulva* Schr., which present some points of similarity, have the large tooth beneath the head on the mandibles. The nearest relative is undoubtedly *A. timberlakei* Ckll., from Riverside, which is much smaller, and has a yellow clypeus. I have regarded *A. timberlakei* as belonging to the subgenus *Micrandrena*, and *A. vandykei* does have the venation of that group.

*Andrena viridinitens* Cockerell, sp. n.

Female. Length about 11 mm., anterior wing 10; head, thorax and legs black, abdomen shining dark olive green; flagellum slightly reddened at apex; tegulæ rather large, very dark brown; head and thorax with abundant long rather dull white hair; third antennal joint about as long as next two together, not nearly as long as next three; process of labrum very broad, rounded, slightly truncate; facial foveæ broad, with thin white hair, going below level of antennæ, separated from orbits by a rather broad punctured band; face much broader than long; clypeus shining, with distinct well separated punctures, somewhat flattened in middle, with no median ridge; cheeks very broad and rounded; mesothorax entirely dull in front, but the disc polished and shining, with few weak punctures; scutellum highly polished, with a median groove, sparsely and weakly punctured; area of metathorax dull and granular; wings hyaline, slightly reddish, with the outer margin distinctly dusky; stigma large, clear red with a dark margin; nervures reddish brown; basal nervure meeting nervulus; second cubital cell receiving recurrent nervure at or slightly beyond middle; legs with mostly white hair, pale fulvous on inner side of tarsi, black below hind knee-plate; hind tibial scopa simple, the hair on outer face and under side extremely long, appearing silvery; hind basitarsi rather broad, as seen from in front showing a bright red fringe on inner side; abdomen polished, without evident punctures; first tergite dull and obscurely purplish in middle; second tergite depressed more than a third, but not nearly half; no hair-bands,

but large loose patches of long pure white hair at sides of tergites 2 to 5; apex with orange-fulvous hair; sternites fringed with very long white hairs.

Meyer's auto camp, Humboldt Co., last half of April, at flowers of *Salix*, 2 females (Cockerell). In Viereck's table of northwestern species this runs to *A. seminigra* Viereck, from Corvallis, Oregon, said to be 12 mm. long, with gray pubescence, the abdomen nearly bare and with steel blue reflection. Among the species known to me, it most suggests *A. subtilis* Smith, from Vancouver I. I examined the type of *A. subtilis*; it has strongly fulvous hair on thorax; stigma narrow, dark red-brown; fovea pale red, and other characters readily separating it from *A. viridinitens*. Viereck sent me a specimen of *A. seminigra*, and on comparing it with Smith's type, it was exactly the same.

#### ANDRENA W-SCRIPTA Viereck

Near Lower Lake, at *Rhus*, 1 female. This is conspecific with one from Stanford University, March 28, 1916 (R. Stinchfield), determined by Viereck, but it differs by the black tegulae and the darker grey-brown hair at end of abdomen. Viereck describes "anal fimbria dark brown."

#### ANDRENA ZYGADENI Cockerell

Fairfax, Marin Co., April 12, 1925, 1 female (C. L. Fox); Lagunitas, Marin Co., April 7, 1907, 1 male (E. C. Van Dyke). The male has the hair of the abdominal bands much shorter than usual, but it may be abraded.

#### DIANDRENA CHALYBIOIDES (Viereck)

Meyers, Humboldt Co., April 18, 1935, at *Ranunculus*, 1 female (Van Duzee). The process of labrum is narrow, strongly emarginate at end. At the Citrus Experiment Station I saw a cotype female from Corvallis, and noted: large, dull green with much erect dull whitish hair; long black hair at sides of face; stigma red. It is easily known from *A. parachalybea* Vier. by the broader, dull green abdomen.

#### *Diandrena marinensis* Cockerell, sp. n.

Male. Length about 6 mm., anterior wing 5 mm.; robust for a male, dark blue, the head and thorax dull, abdomen moderately

shining, hind margin of tergites dark brown; hair of head, thorax and legs very long and pure white, no black hair at sides of face; mandibles reddened at apex; flagellum long and thick, red beneath; wings hyaline; stigma large, dark reddish; nervures pale reddish; basal nervure meeting nervulus; legs black; tegulæ black; abdomen with thin white hair at sides and on apical part.

Compared with *D. puthua* Ckll. (from Pasadena) it differs by the entirely dull dark blue metathorax (base of metathorax shining on *D. puthua*); dull, dark blue mesothorax and scutellum; larger scutellum; lack of a shining spot above eyes; dull first tergite (polished in *D. puthua*); blue instead of dark green abdomen; and first recurrent nervure much more distant from first intercubitus.

Compared with *D. beatula* Ckll. (taken by Timberlake at Riverside on *Baeria gracilis*), it differs by being considerably larger, with black tegulæ, dull first tergite, and other characters.

Fort Baker, Marin Co., March 15, 1925, 2 males (C. L. Fox)  
California Academy of Sciences.

#### DIANDRENA PARACHALYBEA (Viereck)

Fort Baker, Marin Co., March 15, 1925, two males (C. L. Fox).

#### DIANDRENA PERCHALYBEA (Viereck)

Female from Fort Baker. Length about 10 mm., anterior wing 7.4; dull bluish green, flagellum ferruginous beneath except at base; facial quadrangle broader than long, mandibles bidentate, the inner tooth very short and obtuse; process of labrum emarginate; face with long black hair, on cheeks and top of head it is rather paler, distinctly greyish; thorax above entirely dull; area of metathorax granular, with close fine parallel plicæ at extreme base only; hair of thorax rather dilute black at sides but dorsally sordid whitish; tegulæ shining black; wings hyaline, very faintly brownish, stigma ferruginous, nervures reddish; basal nervure falling far short of nervulus, recurrent nervures very far from base and apex of the very long second cubital cell; legs black, with long pale hair, the hind femora green behind; spurs of hind tibiæ red, very long and slender; abdomen dull blue-green, without bands, but thin whitish hair at sides, and apex with pale grey hair; venter with long whitish hair.

The male has a dense pure white beard of clypeus, but long black hair at sides of face, and the long stout flagellum is black.

Fort Baker, Marin Co., March 15, 1925, 1 female, 4 males (C. L. Fox); Muir Woods, Marin Co., April 23, 1911, 1 female (Van Dyke); Mt. Tamalpais, Marin Co., April 28, 1907, 1 male (Van Dyke).

In Proc. Calif. Acad. Sci., Sec. 4, XIV, 1925, p. 187, I gave a brief account of supposed male *D. perchalybea* collected by F. E. Blaisdell at Mokelumne Hill. In 1926 Viereck described *D. cuneilabris*, female, from the same place and collector. I infer that the male probably belonged to *D. cuneilabris*.

#### *Diandrena purdyi* Cockerell, sp. n.

Eight miles north of Ukiah, at *Ranunculus occidentalis* Nuttall, April 21, I took a male which I had considered referable to *D. perchalybea* until I saw the males of that species from Fort Baker and Mt. Tamalpais. It has the antennæ entirely black, the abdomen blue-green, the basal half of area of metathorax with strong plicæ. It differs from *D. perchalybea* thus:

Middle of face shining steel blue, with slight greenish tints; stigma very dark, almost black; basal nervure falling a little short of nervulus; plicæ at base of metathorax very distinct, the intervals shining; abdomen narrower, steel blue, faintly greenish, hind margins of tergites concolorous.....*purdyi* Ckll.

Middle of face green, stigma red; basal nervure more remote from nervulus; plicæ at base of metathorax indistinct, the whole area dull; abdomen broader, distinctly green, with hind margins of tergites more or less evidently brown.....*perchalybea* Vier.

In both, there is long black hair at sides of face. The length is about 7 mm.

*D. nothocalaidis* Ckll. from Colorado, is exceedingly similar to the Californian insect now described, and does have the base of metathorax with distinct plicæ with the surface shining. It is at first difficult to see where there is any difference, but *D. nothocalaidis* has the stigma much lighter and redder, the nervures paler, and the abdomen more shining.

*D. cyanosoma* Ckll. from Claremont, is also related and agrees in the dark stigma. The abdomen is considerably duller, and the metathorax is different; the middle of the face is dull green, and the flagellum is shorter, not so moniliform, and reddish beneath. The species is named after Carl Purdy, the distinguished botanist of Ukiah.

## HALICTIDÆ

*Halictus allonotus* Cockerell, sp. n.

Female. Length about 8 mm., anterior wing 6.3; robust, black, including mandibles; antennæ and legs; head and thorax with scanty fulvescent hair, long and abundant on mesopleura and dense on tubercles; head ordinary; clypeus highly polished, with sparse small punctures, and a row of large punctures above lower margin; supraclypeal area convex, smooth and polished; front distinctly shining; sides of vertex polished; mesothorax flattened, very highly polished, with scattered weak punctures; scutellum shining, with small punctures; area of metathorax crescentic, glistening, with about twenty irregular wrinkled anastomosing raised lines, about the middle forming an open irregular network; posterior truncation with sharp raised lateral margins, which at the top fork widely, one branch extending mesad behind the area but the two do not meet in the middle, the distance between their ends being greater than the length of either branch; sides of metathorax dullish; tegulæ brown with hyaline margins, not punctured; wings reddish hyaline, stigma large, amber-color, nervures very pale; second cubital cell large and square, receiving recurrent nervure at apical corner; second and third intercubital nervures slender, the first stout; third cubital cell short; legs with fulvescent hair, middle tibiæ with a stiff red brush on inner side; hind spur with five short oblique well spaced stout teeth, the first pointed, the others obtuse; abdomen stout and convex, shining, the first tergite extremely brilliant, without evident punctures; third and fourth tergites with pale linear bands on extreme margins; tergites 2 to 4 with rather poorly developed hair-bands at base; apex with whitish hair.

Garberville, Humboldt Co., April 19, 1935, at *Cercocarpus betuloides*, 1 female (Cockerell). A remarkable species, known by its flattened highly polished mesothorax. There is some affinity with *H. truncatus* Rob., which has a normal though shining mesothorax, and much more coarsely sculptured area of metathorax.

## HALICTUS COOLEYI Crawford

Garberville, April 19, very abundant on *Cercocarpus betuloides*, also several at *Orthocarpus faucibarbus* Gray; Underwoods, five at *Ceanothus cuneatus*; Meyers, at *Lupinus arboreus*, var., three; Perrott Grove, at *Brassica campestris*, one (Cockerell). All females.

I had at first referred most of them to *H. robustus* Crawford, which I have from Riverside, March 16, at *Cryptantha intermedia*



(Gray), collected by Timberlake. They all have the appreciably smaller size of *H. cooleyi*, but I find the punctures on first tergite to be variable and the hind spur also variable, but usually showing very distinct oblique teeth or spines after the manner of *H. cooleyi*. The two species are certainly very much alike, and the variable series from northern California shows a certain amount of intergradation.

According to Crawford's table in *Canadian Entomologist*, Sept. 1906, the teeth of hind spur on *H. cooleyi* are not oblique, but they are distinctly so in a cotype from Corvallis.

### *Halictus cyanurus* Cockerell, sp. n.

Female. Length about 5.3 mm., anterior wing 4.2; head and thorax dark olive green, abdomen dark blue; moderately robust, with thin and scanty dull white hair, the abdomen hairy at sides and toward apex, but the tergites with no uniform covering of tomentum; head rather broad and short; mandibles reddened apically, labrum black; clypeus shining brassy, sparsely punctured, with a black margin (seen under microscope both clypeus and supraclypeal area show only very minute, widely spaced punctures); front dull, with minute excessively dense punctures; vertex shining; mesothorax dull (a little shining but not at all polished) with very fine not very dense punctures; scutellum shining, with a median depression; area of metathorax crescentic, appearing rough and dull under a lens, the microscope shows strong plicæ, irregular in middle, and the area is truncate apically in middle; posterior truncation not very sharply defined at sides; tegulæ black, strongly punctured; wings hyaline, with extremely pale stigma and nervures; first recurrent nervure meeting second intercubitus; legs black, with dull whitish hair; hind spur with three stout blunt spines, and a fourth rudimentary; abdomen shining, but not polished, margins of tergites dark reddish; first tergite without evident punctures; venter not metallic.

Garberville, Humboldt Co., April 19, 1935, at *Cercocarpus betuloides*, 1 female (Cockerell). Compared with *H. pavoninus* Ellis, this differs at once by the dark, punctured tegulæ, a character which relates it to *H. helianthi* Ckll. which has a black abdomen. *H. lazulis* Ellis has the face narrower, area of metathorax blue, and different tegulæ. *H. cæruleus* Rob. is much larger and brighter blue. *H. sedi* Sandh. has a green abdomen and a greener, more shining mesothorax.

## HALICTUS EURYCEPS Ellis

Eureka, April 17, 4 females; Mather Grove, April 18, 1 female (Cockerell). Compared with the type from Beulah, New Mexico, the Eureka specimens differ by the black tegulæ, the wings not reddish, and the stigma pale and much less orange. The Mather Grove one has reddish wings and a narrower face. In all the disc of the mesothorax is highly polished. I find that *H. euryceps* is variable and it does not seem practical to separate a Californian race.

These bees are decidedly *H. euryceps* rather than *H. zophops* Ellis, but the two are very close. I separated them as follows:  
 Abdomen broader at base; area of metathorax sculptured nearly all over.....*zophops* Ellis.  
 Abdomen narrower at base; area of metathorax with plicæ largely confined to basal part.....*euryceps* Ellis.

Other characters are cited by Mrs. Ellis, but I do not find the abdomen of *H. zophops* to be appreciably metallic. The table given by Miss Sandhouse is misleading, as the anterior wing of both species is less than 6 mm. long.

## HALICTUS FARINOSUS Smith

Yorkville, Mendocino Co., 4 females, April 24, 1928. One female May 17, 1929 (Van Duzee); Lagunitas, July 15, 1928, 1 female (Van Duzee); Inverness, May 22, 1910, 1 female (Van Dyke).

*Halictus lupinelli* Cockerell, sp. n.

Female. Length about 9 mm., anterior wing 7.2; black, robust, the margins of first four tergites with narrow, very distinct, pure white dense hair-bands, that on first failing in middle; no basal bands; hair at apex pale grey. This falls with *H. lerouxii* Lep. in all our tables, but is smaller, the tegulæ black or nearly so, the second cubital cell high and narrow, receiving recurrent nervure slightly beyond middle (cell large and nervure received near end in *lerouxii*), wings clear, hardly reddish. The hind spur, as in *H. lerouxii*, has strong teeth on basal half, but those on apical half are broad and low, equilateral, so that the spur may be said to be coarsely undulate. The legs are black; the hind basitarsus, as in *H. lerouxii*, having a copper-red brush at end. The hair of head and thorax above is entirely dull white, not fulvescent, perhaps

with a very faint creamy tint, that on mesothorax seems a little longer than in *H. lerouxii*. Lepeletier describes *H. lerouxii* as having red hair at end of abdomen.

Garberville, at flowers of small lupine (*Lupinus bicolor* Lindley) in meadow by river, 1 female (Cockerell). I thought this might possibly be a species found in the Palearctic region, but I cannot match it. It is very different from *H. lerouxii ruborum* Ckll., described from Seattle.

Another female, about 10.5 mm. long, comes from Hopland, May 9, 1926 (Van Duzee). It has the second cubital cell as in *H. lerouxii*, with the recurrent nervure not far from the end, and is intermediate between the type of *H. lupinelli* and *H. lerouxii*. But the dense very white abdominal bands in *H. lupinelli* are much narrower than in *H. lerouxii* from Illinois and Kansas, so I think there are two species involved. In any event *H. lupinelli* is a valid subspecies.

#### HALICTUS NIGRESCENS Crawford

Female about 6 mm. long (Crawford's original description says about 6.5 mm., but in his table he says less than 6 mm.), anterior wing 4.5; mesothorax with fine distinct punctures on a minutely lineolate surface, appearing dull, slightly shining, though the scutellum is polished; area of metathorax very large, covered with fine irregular raised lines; hind spur with three long oblique spines and three short rounded ones, the last quite rudimentary; tegulæ not punctured; first tergite with scattered extremely weak punctures, only seen under microscope; fourth and fifth tergites pruinose pubescent.

From Crawford's account, and especially his table, I should have remained in doubt as to the species, but I have a couple from Riverside, March 1 and 2, at *Eschscholtzia californica*, collected and determined by Timberlake. The insect is considerably less robust than *H. cordleyi* Crawford, near to which it runs in the table.

Garberville, April 19, many at *Cercocarpus betuloides*, and six at *Orthocarpus faucibaratus* Gray (Cockerell); Underwoods, six at *Ceanothus cuneatus*.

#### *Halictus orthocarpi* Cockerell, sp. n.

Female. Length about 8.5 mm., anterior wing 6.7; black, robust, the mandibles, antennæ and legs black; tegulæ very dark brown,

impunctate; hair of head and thorax thin and dull whitish; face rather broad (2 mm. between orbits); clypeus with the upper part dull and finely punctured, the lower part shining and coarsely punctured; supraclypeal are only moderately shining; front densely punctured, and more or less striate; vertex shining right across; mesothorax shining, but hardly polished, the scutellum polished, but with many fine punctures of different sizes; area of metathorax rough and dullish, quite large, under a lens showing fine dense striation, the microscope showing numerous rather weak anastomosing rugæ; posterior truncation dull, distinctly defined all around, with a deep median pit; wings hyaline, faintly dusky; stigma large, pale dull amber; nervures very pale, outer recurrent and intercubitus very weak; second cubital cell conspicuously narrowed above, receiving recurrent nervure a moderate distance from end; legs with dull white hair, hind basitarsi with a copper-red brush at end; hind spur with five short oblique stout teeth, the last two rudimentary; abdomen broad, shining, the first tergite very brilliant, without evident punctures under a lens, but the microscope shows scattered excessively minute punctures; hind margins of tergites very narrowly whitish; tergites with thin poorly developed basal bands of white hair, largely hidden, and distinct traces of thin apical bands at sides, and on fifth tergite right across, but not easily seen; apex with white hair.

Garberville, at *Orthocarpus faucibarbatu*s, 4 females, April (Cockerell). Resembles *H. galpinsiae* Ckll. and *H. aberrans* Crawf., but the area of metathorax is quite different. The area of metathorax is much more finely sculptured than in *H. punctiferus* (Ckll.) In Crawford's key (1907) the position is a little ambiguous as there are traces of apical bands on tergites and the hind spur is rather intermediate between the two categories given, but it really should go to 42, and as the wings are not perfectly clear, and the wrinkles of area reach apex, on to 44. The mesothorax has rather close strong punctures, with very minute ones between, and excessively fine lineolation on anterior part, so the insect would run to *H. cooleyi* Crawf., from which it is easily known by the abdominal characters.

#### *Halictus pilosellus* Cockerell, sp. n.

Female. Length about 5 mm., anterior wing 4; robust, shining yellowish-green, including abdomen; mandibles and labrum dark red; apical part of flagellum light ferruginous beneath; tegulae pellucid testaceous, not punctured; wings clear hyaline, stigma and nervures very pale; legs black, hind knees, tibiae at extreme apex and base of basitarsi, red; a copper-red brush at end of hind

basitarsi; hind spur with four long blunt spines and a fifth rudimentary; hind margins of second and following tergites pallid; tergites 3 to 5 entirely covered with dull white tomentum, first and second with such tomentum at sides and second also at base, but much narrowed in middle, the exposed parts of these tergites brilliantly polished. Face of moderate width; clypeus projecting, shining, brassy, but the apical margin broadly black; supraclypeal area highly polished; front entirely dull; hair of head and thorax above short, faintly yellowish; mesothorax shining, polished on disc, median groove distinct; scutellum shining; area of metathorax crescentic, rather short, appearing rugose under a lens, with a thick shining posterior margin, the microscope shows about eighteen fine wrinkled rugæ with a little smooth space at middle of base; the first recurrent nervure meets the second intercubitus.

Garberville, Humboldt Co., April 19, 1935, at *Cercocarpus betuloides*, 1 female (Cockerell). Compared with *H. pruinus* Rob., it is considerably smaller and the head is shorter. The structure agrees better with the blue-green *H. pruiniformis* Crawford. *H. pilosus* Smith is larger, with dull mesothorax. I was at first inclined to refer this to *H. actinosus* Sandh., but that is distinctly larger with various small differences, and Miss Sandhouse compares her species with some which are not the nearest relatives to ours. In the table in Proc. U. S. Nat. Mus., Vol. 65, Art. 19, p. 2, at 17, the expression "wings not thus clear, stigma darker" is misleading, since some of the species falling in this division have the stigma exceedingly pale (e.g. *H. lazulis* Ellis).

#### *Halictus tracyi* Cockerell, sp. n.

Female. Length about 6.7 mm., anterior wing 5.6; robust, with broad convex, shining abdomen; black, including mandibles, antennæ, legs, and the shining impunctate tegulæ; hair of head and thorax scanty, dull whitish, with a faint yellowish tinge dorsally; legs with white hair, pale yellowish on inner side of tarsi; abdomen with dull white hair at apex, and thin hair at sides, but no hair-bands or spots; facial quadrangle longer than broad; clypeus prominent, shining, with large punctures; supraclypeal area polished but punctured; front dull, shining along orbits; vertex on each side of ocelli dull, except a polished area next to ocelli; mesothorax strongly and closely punctured, shining but not polished, the median groove very strong; scutellum polished, slightly depressed in middle; area of metathorax very large, dull, with fine irregular anastomosing raised lines (as seen under microscope), no regular parallel plicæ; area behind with an obtuse shining border; truncation of metathorax not sharply defined above; mesopleura convex,

posteriorly shining; wings hyaline, a little dusky, the stigma very dark brown, nervures brown; basal nervure falling short of nervulus; second cubital cell very broad, receiving recurrent nervure near end; outer intercubitus in middle much more slender than the others; hind spur strongly pectinate, with six oblique spines; abdomen polished; first tergite with widely spaced excessively minute punctures.

Eureka (type locality), Humboldt Co., April 17, 1935, 13 females (Cockerell); Garberville, April 19, at *Cercocarpus betuloides*, 1 female; Perrott Grove, three females at *Brassica campestris*; Mather Grove April 18, at *Oxalis*, a species with pink flowers, 1 female (W. P. Cockerell); Meyers, at *Lupinus arboreus* var. 1 female (Cockerell). Named after Joseph Tracy, the skilled botanist of Eureka, who guided us to the spot where the bees were found. In Crawford's table (1907) it goes to *H. divergens* Lovell, but is easily known from that and related species by the lack of hair-patches on abdomen. It is larger and more robust than *H. vaporellus* Ckll., with darker stigma and broader head. The hind spur separates it from *H. inconditus* Ckll. and *H. supranitens* Ckll. At Eureka they were found nesting, and also in numbers at flowers of *Claytonia sibirica* (L.) The nests were in earth on the base of a fallen tree.

#### PANURGIDAE

##### PANURGINUS MELANOCEPHALUS Cockerell

Mark West Spring, April 23, two females at *Ranunculus*.

This was printed (Pan. Pac. Ent. Oct. 1926, p. 80) as *Panurgus melanocephalus*, but my manuscript had it *Panurginus*. *P. morrisoni* Crawford (also taken at *Ranunculus* flowers) is evidently the same. Crawford's paper is dated Dec. 1926, and was actually published in January 1927.

##### PANURGINUS NIGRELLUS Crawford

Garberville, April, at *Cercocarpus betuloides* Nuttall; eight miles north of Ukiah, April 21, at *Ranunculus occidentalis* Nuttall; Petrified Forest, Sonoma Co., April 23, at *Ceanothus foliosus* Parry. All females. Crawford defines this species on male characters alone, and records numerous males from the region around Stanford University. The females differ from *P. atriceps* (Cresson), as I understand it, by the short, dusky wings, and the black

or practically black tegulæ (Cresson says of *P. atriceps* "tegulæ dull testaceous").

#### ANTHOPHORIDÆ

##### ANTHOPHORA CALIFORNICA Cresson

Mt. Diablo, nesting in bank, 6 females; 1 male, at *Salvia mellifera* Greene. They were not observed to make the usual structures at the entrance to the nests.

##### ANTHOPHORA IGNAVA Cresson

Garberville, four females at *Cercocarpus betuloides* Nuttall, and two (W. P. C.) at *Lupinus albifrons* Bentham. This species was described from Nevada, but is supposed to be the female of *A. pacifica* Cresson taken by Hy. Edwards in California. A related form from Mesa Verde, Colorado, was described in 1930 as *A. subignava* Cockerell. This last is more robust, with white hair on thorax above. *A. ignava* from Yakima, Washington, differs from the Garberville series by the pea-green instead of black or practically black eyes, and the tegulæ rufous with a dark base, instead of practically black. A male *A. pacifica* from Mill Valley, Calif. (Van Duzee) certainly appears to be the male of the Garberville insect.

Mr. E. T. Cresson Jr., has kindly given me this information about the Cresson series of this species:

"Our series of this species, all females of course, are three from Nevada, two from California, two from Oregon. The color of the eyes is apparently somewhat greenish; that of the tegulæ is black to slightly reddish. They agree in all these respects with our specimens of *A. pacifica*, as well as in the color of the pile on the legs. I would say that the two series are conspecific, as you suggest." (litt. July 11, 1935).

Mr. P. H. Timberlake writes (litt. July 18, 1935) that there is no doubt that *A. ignava* is the female of *A. pacifica*.

##### ANTHOPHORA INFERNALIS Dalla Torre

Garberville, at flowers of *Lupinus albifrons* Bentham, 1 female (W. P. C.). Timberlake writes (in litt.) that this is a melanic variety of *A. pacifica* Cresson, occurring only in the female. It seems to be the only form of the female that occurs in Southern California.

## ANTHOPHORA SIMILLIMA Cresson

Mark West Springs, April 23, 1 male, at *Cynoglossum grande* Douglas.

## EMPHOROPSIS DEPRESSA (Fowler)

Garberville, 1 female, at *Cercocarpus betuloides* Nuttall.

## EMPHOROPSIS MURIHIRTA Cockerell

Garberville, at *Lupinus albifrons* Bentham (W. P. C.), 1 female. Meyer's auto camp, Humboldt Co., 3 females at *Lupinus arboreus* Sims. variety, and 1 female at *Lathyrus vestitus* Nuttall.

## BOMBIDÆ

## BOMBUS CALIFORNICUS Smith

Mt. Diablo, one female at *Salvia mellifera* Greene.

BOMBUS EDWARDSII Cresson (*fernaldi* Franklin)

North of Laytonville (W. P. C.), workers at *Lupinus* and *Trifolium*; Garberville, workers at *Lupinus albifrons* Bentham, *L. bicolor* Lindley, *Sisyrinchium*, and *Cercocarpus betuloides* Nuttall; eight miles north of Ukiah (W. P. C.), at *Ceanothus cuneatus* (Hooker); Myers' auto camp, at *Lupinus arboreus* Sims, variety. Only workers were taken.

## BOMBUS VOSNESENSKII Radoszkowski

Underwood's cabins, one female at *Ceanothus foliosus* Parry; north of Laytonville, one worker at *Pedicularis densiflora* Bentham; Myers' auto camp, one worker on *Lupinus arboreus* Sims, variety.

## HYLÆIDÆ

## HYLÆUS CRESSONI (Cockerell)

Petrified Forest, at *Ceanothus foliosus*, April 23, 1 male (Cockerell); Garberville, April 19, at *Cercocarpus betuloides* 1 male (Cockerell).

## HYLÆUS NUNENMACHERI (Bridwell)

Petrified Forest, Sonoma Co., April 23, 1 male (Ckll.) It was at flowers of *Ceanothus foliosus* Parry. A male was also taken on *Ceanothus* at Mark West Springs, April 23, (Van Duzee).